CSIR NEWS

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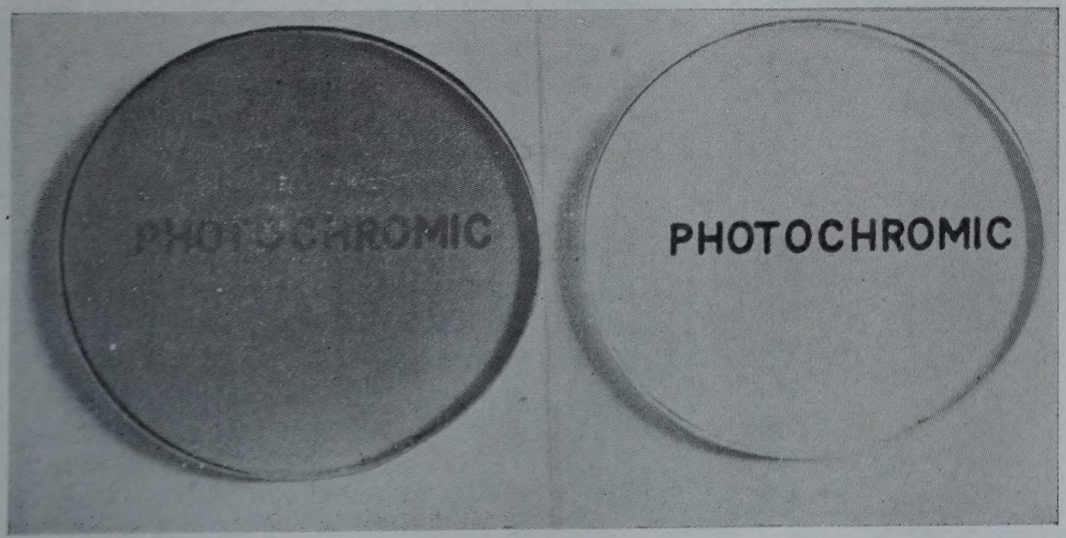
CGCRI Develops Photochromic Glass

The Central Glass & Ceramic Research Institute (CGCRI), Calcutta, has developed a process for the production of photochromic glass. Photocromic glasses are used as lenses for prescription spectacles and sunglasses for protection against glare. They are also used in window panes, windshields of cars and in other areas where dynamic control of sunlight as a function of its intensity is needed. Photochromic glasses also have applications in opto-electronic storage devices with self-erasing of information, and as modulators in optical transmitting systems where changes in the quantity of light may be used for control or regulatory purposes. At present, photochromic glass is entirely imported.

Photochromic glasses get deeply coloured on exposure to sunlight and ultraviolet radiations. The colour disappears on withdrawing the photochromic glass from the radiations. The photochromic process in these glasses is due to the reversible photodissociation of silver halides. A very careful control of the composition, batch preparation, melting schedules, annealing and heat treatment is required to make the glass photochromic.



Photochromic glass developed at CGCRI, Calcutta. The glass shows darkening consequent upon exposure to sunlight for 30s. Right : The same glass exhibits disappearance of the darkening effect a few minutes after its removal from exposure

Impact of Thermal Environment on Miners

Mining work, which is considered as one of the arduous industrial jobs, becomes more difficult as underground environment is adverse in most of the cases. Studies conducted by the Central Mining Research Station (CMRS), Dhanbad, in a large number of coalmines in Jharia and Raniganj coalfields have shown that the environmental temperature in many of the working faces is about 90°F (32°C) (dry bulb) with high relative humidity. On several occasions the thermal condition in working faces has been found as extreme as 94°F (34°C) with very little differences in dry and wet bulb readings and with very little movement of air.

An investigation has been conducted to find out energy expenditure on various types of mining work. On the basis of the findings the work has been classified into four groups, namely (i) unduly heavy, (ii) very heavy, (iii) heavy, and (iv) moderate.

Shovelling and load-carrying at a gradient of 1 : 8 have been placed in the first group. Pick-mining, load-carrying in stooped condition, pushing of loaded tub and drilling on rock have been considered 'very heavy'. Load-carrying on level road and drilling on coal face come under 'heavy' group. Machine drilling is the easiest job of all mine works.

A study has also been made to assess the working capacity of Indian miners. It has shown that on an average an Indian miner is poorer in health compared to a western miner. The average body weight of an Indian miner is less than 50 kg whereas that of a western miner is 65 kg. The maximum working capacity of an Indian miner in the physiological term of maximum oxygen uptake is less than two litres per minute compared to about three litres for a western miner. But, it has been found that the efficiencies of an average Indian miner and of an average western miner are proportionate to the body weight.

It is felt that if the underground environment is improved by proper ventilation the output of an Indian worker will be better.

Physiological evaluation of the work stress of a miner : CMRS Dhanbad

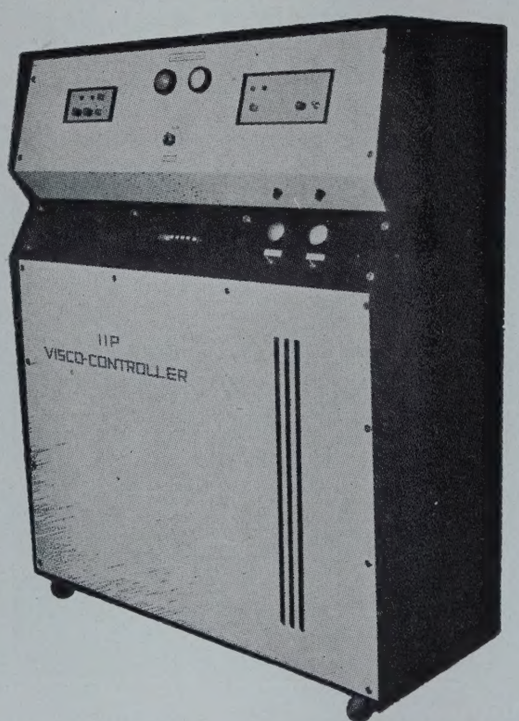
On the basis of the above study, optimum rates of pick-mining, shovelling and load-carrying work that can keep the workers free from undue fatigue are recommended.

The study showed that maximum environmental temperature should not exceed 29°C corrected effective temperature. Also, the maximum oral temperature and maximum body dehydration of a worker should not be more than 37·9°C and 5% of the body weight respectively.

Automatic Visco-Controller

An on-line viscosity controller has been developed, for the first time in the country, at the Indian Institute of Petroleum (IIP), Dehra Dun. This is a capillary type viscosity controller in which the oil sample is supplied to the capillary at a constant temperature and at a constant flow rate. The pressure drop across the capillary under these conditions is conveyed to a pressure transmitter. The controller unit is completely solid-state and makes use of the latest techniques in control circuitry.

The instrument has a total range of 10-3000 cp and its control is better than 1% of the scale. Any viscosity range between 10 and 3000 cp can be selected depending upon the characteristics of the capillary used. Its technical specifications and sensitivity are comparable with those of any imported unit of this type.



Automatic visco-controller developed at IIP, Dehra Dun

The viscosity controller will find wide industrial applications in refining processes (e.g. vacuum tower, blending, de-asphalting, and dewaxing), in the control of furnace oil viscosity for maximum efficiency and minimum pollution, and in various petrochemical processes.

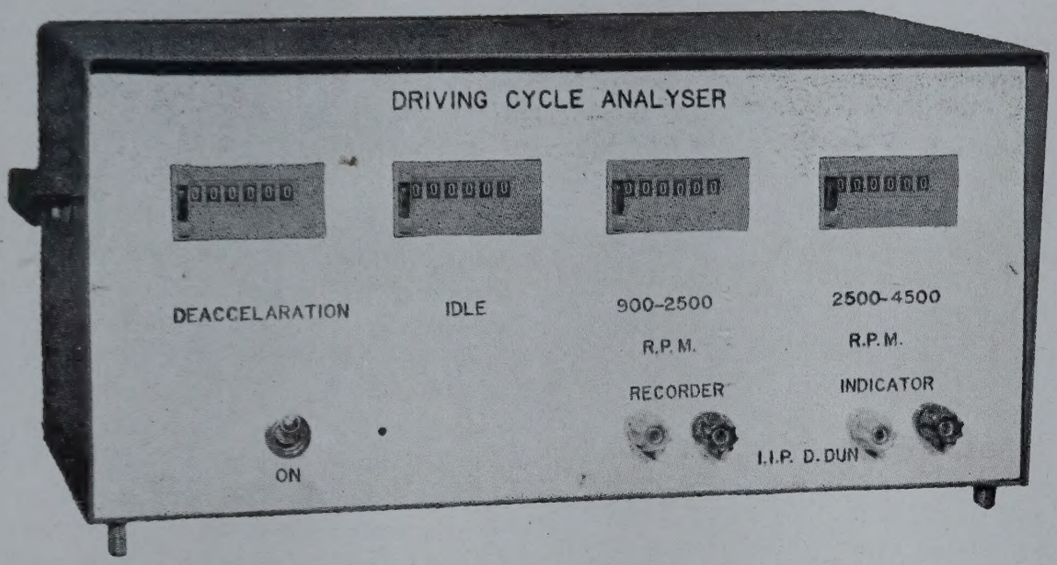
IIP Develops Driving Cycle Analyzer

The Indian Institute of Petroleum (IIP), Dehra Dun, has designed and developed, for the first time in the country, a driving cycle analyzer which can serve a number of purposes apart from the main purpose of evaluating the driving cycle.

In India, no standards have been laid down as regards the driving cycle, but such standards already exist in various other developed countries such as USA and Japan. With the help of this analyzer, it will be possible to standardize the driving cycle for the country. IIP plans to conduct trials on the analyzer first at Delhi and then in various other major cities, and finally standardize a driving cycle for the country. Driving cycles are very important for fuel consumption and vehicle emission studies. When developed, the cycle will also make it possible to estimate accurately saving in fuel or the emission of pollutants by the vehicles if vehicles are operated at certain speeds.

Though primarily meant for developing a driving cycle, the analyzer will also facilitate in assessing the driving capabilities of the drivers. It can give data on driving habits, and transport authorities can make accurate judgement regarding fuel-saving capability of drivers while issuing driving licences and thus help in saving a substantial amount of fuel.

The instrument essentially consists of three parts : an electronic clock, a speed (rpm) sensing unit, and comparators. The electronic clock, which



Driving cycle analyzer developed at IIP, Dehra Dun

is capable of measuring one-tenth of a second, is connected to different displays of the instrument depending upon the driving conditions of the vehicle. The speed signal is picked up from the ignition coil. The instrument is compact, light-weight, reliable and has adequate accuracy. The specifications of the driving cycle analyzer developed at IIP are : (i) accuracy with respect to time, 0·5%; (ii) accuracy with respect to speed (rpm), better than 1·5%; and (iii) range, 0-5000 rpm.

Summer Institute on Food Processing and Preservation

A one-month summer institute on Food Processing and Preservation was organized at the Central Food Technological Research Institute (CFTRI), Mysore, starting from 30 May 1977. Jointly sponsored by the Indian Council of Agricultural Research and CFTRI, the summer institute was designed to provide necessary orientation to teachers, and research and extension workers from agricultural and home science colleges in food processing and preservation with a view to bringing their knowledge up to date. It also attempted to improve the effectiveness of their teaching or profession through enhanced understanding of the subjects. CFTRI was chosen by ICAR as the venue of the summer institute because of its excellent facilities for research and teaching. Expert scientists from CFTRI organized lectures, practicals and demonstrations in this orientation programme which was attended by 25 persons.

Inaugurating the summer institute, Shri C. P. Natarajan, Deputy Director, CFTRI, stressed the importance of post-harvest technological practices for the agricultural scientists in the country. Dr S. P. Manjrekar, course director, outlined the scope of the orientation programme, which included coverage of the basic raw materials, principles and operations of food preservation, processing and marketing, and a field trip.

NEERI Launches Massive Deworming Programme

The National Environmental Engineering Research Institute (NEERI), Nagpur, launched on 14 May 1977 a seven-day mass medication programme aimed at deworming of rural population numbering about 800 in Avandi, a village 18 km from Nagpur on the Nagpur-Bhandara Road. The programme formed part of NEERI's rural sanitation project, which is in progress in collaboration with the Zilla Parishad, Nagpur. This is the biggest attempt of medication for deworming to be undertaken in Vidarbha and will improve the general health status of the villages. An earlier survey had revealed that 70% of the population in Avandi was infected with various parasites including hookworm and ascaris.

The Nagpur Zilla Parishad provided the medicines for removing the worm load of the infected population. Dr S. W. Kulkarni, Reader in Preventive and Social Medicine, Grant Medical College, Bombay, the District Health Officer of Nagpur Zilla Parishad and doctors of Gunthala Primary Health Centre assisted in this programme.

World Environment Day at NEERI

To commemorate the opening of the UN Conference on Human Environment held at Stockholm in June 1972 the National Environmental Engineering Research Institute (NEERI), Nagpur, celebrated the World Environment Day on 5 June 1977. The UN conference had decided on the creation of a UN Environment Programme (UNEP). NEERI has been actively associated with the programme. The institute was assigned the responsibility to identify the institutions and capabilities of monitoring air and water pollution in seven important regions of south and south-east Asian countries. The first phase has been completed. In the second phase, NEERI would play a vital role in monitoring activity and training of personnel.

The institute observed 'open house' on 5 June 1977 for providing opportunity to visitors to have a first-hand knowledge of its R&D activities. A special postage stamp was issued by the Indian Posts & Telegraphs Department to mark the occasion.

Course on Sub-Soil Exploration—Field and Laboratory Testing

This course was organized jointly by the Central Building Research Institute (CBRI), Roorkee, and the University of Roorkee at CBRI from 9 to 21 May 1977 under the auspices of the

local chapter of the Indian Geotechnical Society (IGS). The course was intended to acquaint the personnel engaged in execution, supervision and subsequent interpretation of the field programmes with the soil exploration techniques. Prof. A. S. Arya of the School of Research & Training in Earthquake Engineering, and chairman, IGS Local Chapter, Roorkee, inaugurated the course. Nineteen participants from different parts of the country attended the course wherein details of exploration techniques were discussed and their applicability was demonstrated by prototype tests in the field.

The faculty for the course comprised Prof. Dinesh Mohan, Director, CBRI; Prof. Shamsher Prakash, Civil Engineering Department, University of Roorkee; Dr R. K. Bhandari, Head, Soils Division, CBRI; and a number of professors from the University of Roorkee and scientists from CBRI.

Prof. Dinesh Mohan distributed certificates to the participants on 21 May 1977.

Deputation Briefs

Shri R. N. Bose of the Central Fuel Research Institute (CFRI), Dhanbad, served as an expert to Afghanistan on coal washing and briquetting under the International Technical and Economic Cooperation Programme for about three years. Shri Bose returned to CFRI on 10 January 1977.

At the North Coal Department of the Government of Afghanistan, Shri Bose made extensive studies on the properties of Afghan coals, their utilization potentialities, problems of their briquetting and carbonization, and rational planning for the production and distribution of coals in the seven-year plan of that country. Shri Bose was associated with the preparation of the following reports/notes during his deputation : Production of smokeless coal briquettes for domestic use (in Afghanistan); Programme for production of coal bricks/briquettes at various briquetting centres of Afghanistan in 1976-77; A comparative study of the costs of different fuels and electricity for heating in winter (in Afghanistan); and Problem of briquetting and carbonization of coal (in Afghanistan).

Based on coal samples sent by Shri Bose from working coalmines of Afghanistan, special investigational study was completed by CFRI and recommendations were submitted to the president of North Coal Department of Afghanistan towards assessing briquetting and carbonization potentialities. His assignment has opened up possibilities of further Indo-Afghan collaboration in technology research. Proposals were under consideration by the Ministry of Mines and Industries of Afghanistan for initiating development projects on coal in collaboration with CFRI.

* * *

Dr V. S. Nair of the Central Food Technological Research Institute (CFTRI), Mysore, attended, on deputation, the working meeting of the United Nations University (UNU) held at the UNU headquarters in Tokyo from 10 to 14 January 1977. The meeting was arranged to discuss and make specific recommendations on UNU's role as a centre for the dissemination of knowledge, and on planning the programme of the UNU Press.

The meeting was attended by 16 experts in the area of communication and publishing, including the Rector and two Vice Rectors of UNU, Director and Chief of UNU Press and Academic Services. The meeting discussed how UNU should deal with dissemination activities in the light of the university's charter. In the course of the discussions, the experience of the three UNU associated institutes, namely CFTRI, Institute of Nutrition of Central America and Panama (INCAP) in Guatemala, and the Nutrition Centre of the Philippines (NCP) in Manila, was briefly explained by the representatives of the respective institutes.

Dr Nair also presented at the meeting a paper dealing with CFTRI's work in the dissemination of research results.

ADVANCES IN ORGANIC CHEMISTRY

Bhatnagar Prize-winner
Dr Nagarajan's Work

Dr K. Nagarajan's work covers several areas of organic chemistry such as natural products (plant products and antibiotics), nuclear magnetic resonance spectroscopy, heterocyclic and medicinal chemistry, discovery of novel reactions and investigation of their pathways and small-ring compounds.

Work in the area of nuclear magnetic resonance spectroscopy has been primarily concerned with proton resonance and has embraced a variety of applications to structural, configurational and conformational problems. One of these studies was concerned with restricted rotation of the amide bond in N-acyl indolines and tetrahydroquinolines and estimation of the energy barrier between the E and Z forms in the former. This study additionally revealed the existence of allylic strain in N-acyltetrahydroquinaldines forcing the methyl group into an unexpected axial conformation and finally led to NMR and X-ray demonstration of axial conformation of methyl groups in mono and dimethyl dihydropyrido [3,2,1-de] phenanthridin-8-ones. Another interesting application of PMR spectroscopy originated in the observation of an unusually high field chemical shift for the methyl group in 2-methylamino-4-phenylbenzothiazole. This shift exhibited high solvent and concentration dependence. Hydrogen-bonded dimeric structure for this and other 2-alkylaminobenzothiazoles offered a convincing explanation for

Dr K. Nagarajan

Dr K Nagarajan of the CIBA-GEIGY Research Centre, Bombay, has been awarded the Shanti Swarup Bhatnagar prize in chemical sciences for the year 1974 (jointly with Dr U. R. Ghatak) [*CSIR News*, 27 (1977), 57].

this phenomenon. Other NMR studies include long-range shielding effects in 1-substituted benzo (f) quinolines, estimation of energy barrier to cyclohexane ring inversion using a fluorine 'marker', conformation of carpaine, pseudocarpaine and 13-methylprotoberberines, enamine reactivities, long-range couplings in thietane dioxides and the phenomenon of diastereotopy in ethyl groups at or near a chiral centre.

A major activity of Nagarajan at CIBA-GEIGY Research Centre is in the area of heterocyclic and medicinal chemistry and is concerned with the design of organic molecules of potential medicinal importance in the fields of fertility, bacterial and tubercular infections, parasitic diseases like helminthiasis and amoebiasis, disorders of the cardiovascular and central nervous systems, diabetes, etc. In this connection Nagarajan has investigated several hetero tri- and tetracyclic systems like dibenz [b, f] [1, 4]- oxa-, thia- and di-azepines, pyridobenzoxazine, oxazepine and oxazocines, pyridobenzothiadiazines, pyridophenanthridines, pyrroloquinoxalines and cycloalkindoles. Particular mention may be made of a new, simple and efficient synthesis of the dibenzoxazepine ring system by alkali-induced ring closure of N-(2-chloro-5-nitrobenzoyl)-2-aminophenol. The resultant 2-nitrodibenz [b, f] [1, 4] oxazepinone was transformed into an array of products with diverse activities on the central nervous system (neuroleptic, thymoleptic, analgesic, anticonvulsant). A clinically useful antidepressant has been developed. The synthetic route was extended to the tetracyclic pyridobenzoxazepine ring system.

Among the other activities in medicinal chemistry may be cited the synthesis of a number of anti-implantation agents like 1-arylthiosemicarbazides, 1,2-diaryltetrahydroisoquinolines and 1,2- diaryl-4,5,6,7-tetrahydroindoles, and also of the 2,3-benzodiazepine analogues of diazepam.

The synthetic potentialities of acetylene dicarboxylic esters in the construction of heterocycles have been explored.

During the course of extensive exercises in heterocyclic and medicinal chemistry, Nagarajan has come across many novel reactions and has explored their pathways. For example, in a study of the synthetic utility of 2-phenacylcyclohexane-1,3-diones, their reaction with N,N-disubstituted hydrazines was found to give 3-amino -2-aryl-4-oxo-6, 6-dimethyl-4, 5, 6, 7-tetrahydroindoles instead of the expected 1-amino compounds. Details of this interesting transformation were worked out. A further novel reaction was observed for 5-oxo 1, 4, 5, 6, 7, 8-hexahydrocinnolines obtained from 2-phenacyldimedones and hydrazine. The ketohexahydrocinnolines were converted in high yields to 5-aminocinnolines upon exposure to hydrazoic acid. This represents probably the first reported instance of aromatization under Schmidt reaction conditions. The 5-oxohexahydrocinnolines also afforded interestingly, upon reaction with hydroxylamide, oximes of the more aromatic 5-keto-5,6,7,8-tetrahydrocinnolines which underwent Semmler-Wolff aromatization under several acidic conditions.

Another interesting transformation is concerned with the formation of *p*-toluidines from 4-dichloromethyl-4-methyl-2,5-cyclohexadienones and secondary amines. Under similar conditions, the ortho dienone yielded only *o*-cresol. The differing courses of reaction were rationalized on mechanistic grounds.

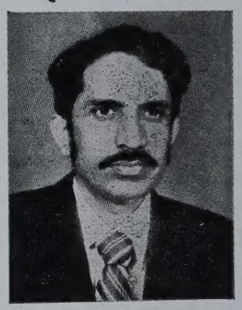
The formation of para- in addition to alpha-substituted products in the displacement reactions of alpha-chlorodiphenylacetamides with cyclic secondary amines constitutes a novel and unexpected observation in a seemingly simple reaction. The reaction did not go through a strained alpha-lactam intermediate.

Nagarajan has made significant contributions to the elucidation of structures of several natural products by degradation and application of physical methods like NMR spectroscopy and by synthesis. Examples include alkaloids (tylophorine, kopsine, fruticosine, gentianine, crebanine), oxygen heterocycles (wedelolactone), sesquiterpene (ishwarone) and antibiotics (amicetin). He has also contributed to the development of a new synthetic method for peptides, involving nitrile oxides.

HEMOGLOBIN IN GENETICS AND EVOLUTION

Bhatnagar Prize-winner
Prof. Barnabas' Work

It has been known for some time that subunit structures and amino acid sequences of proteins of contemporary species contain a record of genetics and phylogeny. However, it is only recently that it has been possible to decipher this molecular record because the collinearity of amino acid sequence of the protein with the nucleotide sequence of the structural gene is established, and also the codon catalogue of 20 different amino acids is known. Prof. John Barnabas and his coworkers have, for the last 15 years, been deciphering the genetic and phylogenetic record contained in the primary structure of hemoglobins of vertebrates.



Prof. Barnabas

Initially, Barnabas and his coworkers evaluated the hemoglobin diversity in different mammalian species by isolating the α-and non-α-chains and characterizing the isolated chains by analyzing their tryptic peptides. This was followed by correlation of the hemoglobin structure with genetics. Some of the significant contributions that have come from these studies are as follows :

(1) Duplication of hemoglobin loci

Prof. John Barnabas of Ahmednagar College, Ahmednagar, has been awarded the Shanti Swarup Bhatnagar prize in biological sciences for the year 1974 [*CSIR News*, 27 (1977), 57].

is of widespread occurrence in mammalian species. Studies on gene duplication got impetus in 1965 when they showed for the first time the presence of duplicated α-chain genes in buffalo hemoglobins. As a result of gene duplication, genetic cross-over between tandem duplicates is possible and is increasingly being found in mammalian hemoglobins. Thus, Hemoglobin Lepore-Hollandia, an abnormal human hemoglobin, which was shown by them to contain N-terminal sequences of δ-chain and C-terminal sequences of β-chain is a classical example of a hemoglobin which is the product of a hybrid gene formed by unequal cross-over between linked β- and δ-chain genes.

(2) Allelic variants of hemoglobins present in a number of bovid species differ by multiple amino acid substitutions.

(3) Electrophoretically-silent hemoglobin variants occur widely in mammalian species. Of the 45 adult molecular forms characterized, by Barnabas and coworkers, from animal species of nine genera belonging to the family Bovidae, 22 were electrophoretically silent.

In collaboration with Goodman and Moore, Barnabas has studied the evolutionary descent of α- and non-α-chain loci of hemoglobins and myoglobins of vertebrates. To achieve this, they developed a mathematically proven method based on three theorems and used the method to derive phylogenetic trees. Based on this, they showed that separate genes coding for myoglobin and hemoglobin could be traced to a gene duplication which occurred when annelids and chordates still shared a common ancestor. They also traced those codings for α- and β-chains to a gene duplication in the common ancestor of teleosts and tetrapods, those for γ- and β-chains to a gene duplication in basal therians, and those for β- and δ-chains to a gene duplication in the basal catarrhine primates.

In recent years, Barnabas and coworkers have studied the genetics and evolution of animal species belonging to three mammalian orders : artiodactyls, rodents and primates. They have not only established gene duplication as the basis of hemoglobin heterogeneity in some bovids, murids and cercopithecoids, but have also located, by constructing phylogenetic trees, the evolutionary origins of new genes that arise during globin gene evolution. Thus, for example, the evolutionary origin of human zeta chain gene was traced to basal eutherians and that of duplicated α-chain genes of goats to basal caprines. From the phylogenetic trees of mammalian α-globin, β-globin and myoglobin sequences, Barnabas and coworkers have also derived phyletic relationship of mammalian species. The globin gene phylogenies show that rodent line separates just before the separation of primates and ungulates. In the primate line of descent, prosimians are followed by anthropoids which in turn give rise to platyrrhines and catarrhines. The catarrhine primates further separate into cercopithecoids and hominoids. Similarly, in the ungulate line of descent perissodactyls are followed by artiodactyls which further separate into pig branch and ruminant branch. In the ruminant line of descent, cervid branch is followed by bovid branch which in turn separates into bovines and caprines. Thus, in general, the branching arrangements of mammalian globin phylogenetic trees closely parallel the traditional taxonomic division of the animal species in which these globins are found.

PROGRESS REPORTS

NML Annual Report : 1975-76

The National Metallurgical Laboratory (NML), Jamshedpur, has published its annual report for 1975-76. According to the report the laboratory maintained its stress towards the transfer of technology and industrial implementation of its various development projects. India's first sponge iron plant with a capacity of 25-30 thousand tonnes per annum based on the technology of solid reduction process as developed by the laboratory has been commissioned at the plant site of Andhra Cement Co. at Vijayawada where the technology was experimented upon on large scale. With the assistance of NML scientists, Andhra Cement Co. have modified a cement rotary kiln for production of sponge iron. The trial conducted by the NML scientists at the plant site produced sponge iron of greater than 90% metallization.

The laboratory succeeded in producing ferro-vanadium from the vanadiferous iron ores available near Bhadravati at the Visvesvaraya Iron & Steel Works in their 1500 kVA electric furnace. A significant advantage of the NML process is that the principal byproduct is a high-grade pig iron low in phosphorus and silicon, which is in great demand for the manufacture of malleable castings and S. G. iron.

The NML-PM2 electric-grade alloy aluminium conductor was being produced on tonnage quantities by the various licensees. In recognition of the work on NML-PM2, the Cable & Conductor Manufacturers' Association have given an award to NML.

The lead concentrate from Bondulamutte contains 55-60% lead. Laboratory scale experiments were conducted to find out the optimum recovery of lead from lead concentrate. These experiments gave about 90% recovery and the purity of the metal was 99.9%. Larger scale trials were also made in Morgan type tilting oil-fired furnace; the trials confirmed the feasibility of the method.

A method was developed to produce zinc oxide conforming to IS:3399-1965 from galvanizers' zinc ash and byproduct zinc hydroxide of sodium hydrosulphite industry. The process has been referred to NRDC.

Dental amalgam alloy is a silver based alloy with an appreciable amount of tin and minor additions of copper and zinc and is imported at present. The alloy has been developed at NML and samples have been sent to

Tata Main Hospital for clinical performance trials.

Further improvement in solvent extraction of nickel from leach liquors has been made by designing and fabricating a new apparatus which works on a continuous basis and is based on hydrocyclone principle. This improved device is much faster than the mixer settler unit, developed earlier by NML, and requires much less inventory of organic reagent to start and keep the unit in operation.

Hot strength characteristics and breakdown properties of a self-setting agent for sodium silicate bonded sand developed at NML were studied and industrial scale trials were completed at two different production centres. The work has been extended to the study of other self-setting agents being developed on similar lines.

Phase I of Sukhinda Nickel Project for extraction of nickel from nickel ores has been successfully accomplished in collaboration with Chemical & Metallurgical Design Co. Ltd.

The technology of production of electrolytic manganese dioxide was transferred to T. K. Chemicals, Bombay, who were setting up a plant at Trivandrum for its commercial production. Commercial production of zinc dust, based on the laboratory's technology, was started.

To help set up a central pelletization plant in the Bihar-Orissa region, NML conducted comprehensive studies on beneficiation and pelletization of iron ore fines from different areas at the instance of Metallurgical & Engineering Consultants (India) Ltd. Beneficiation studies were conducted on low-grade copper ore, iron ore, phosphate rock, kyanite, graphite and coal washery fines on behalf of Hindustan Copper Ltd; Pyrites, Phosphate & Chemicals Ltd; Gujarat Mineral Development Corporation; and Tata Iron & Steel Co.

The creep testing facility was being increasingly utilized by the consumer industries with the cooperation of UNIDO experts and NML scientists working in the field. NML entered into an agreement with Bharat Heavy Electricals Ltd on a five-year project for the development of creep-resistant steels.

The basic research projects investigated relate to liquid-solid transformation in aluminium alloys at fast cooling rates, structure and phase transformation studies of rapidly solidified thin films of Al-Cr alloys from liquid state, kinetics and mechanism of alkali attack on aluminosilicate refractories, and studies on sintering in the presence of a liquid phase in some ceramic systems.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Rice Bran Stabilizer

Rice bran is a valuable byproduct of the rice milling industry. It contains 15-20% oil which can be used for edible purposes. However, the bran oil is presently being largely used for industrial purposes only, as it contains more free fatty acid (FFA) than allowed for in the edible-grade oil.

Rice bran contains an active enzyme system lipase, which acts on the oil in the bran as soon as the bran is separated from brown rice during the polishing operation. The FFA content in the bran oil rapidly increases and when it goes beyond 15%, the refining losses become high, and conversion into edible oil becomes uneconomical.

To prevent the increase in FFA, the Central Food Technological Research Institute (CFTRI), Mysore, has developed a rice bran stabilizer to stabilize the bran before extraction. The rice bran on being conditioned in this equipment gets stabilized. The FFA content is kept below 4%, as a result of which extraction of edible oil is facilitated.

The rice bran stabilizer developed by CFTRI is simple in construction and can be fabricated indigenously. It needs no special accessories and controls. The bran is conditioned in the jacketed cylinder of the stabilizer under optimum conditions to inactivate lipase.

A prototype unit of 250 kg/batch capacity is under operation for more than two months. Detailed drawings, design details and layout of the plant can be supplied to interested parties.

The rice bran stabilizer would have an excellent application as an accessory to an existing rice mill or a solvent extraction plant. Unstabilized rice bran costs about Rs 900 per tonne, whereas the stabilized rice bran can fetch Rs 1000 per tonne or more.

An estimated quantity of 20 lakh tonnes of rice bran is available in the country and this can yield edible oil to the extent of 1·5 lakh tonnes at 50% utilization. Besides, deoiled bran has higher market value as balanced animal feed.

The capital investment for fabrication and installation of a stabilizer with a capacity for treating 4 tonnes of bran per day (one shift of 8 hr only) is estimated as follows: (i) fixed capital on land and building, Rs 50,000; and (ii) fixed capital on equipment fabricated and purchased, including suitable boiler, Rs 65,000. The annual cost of stabilization, inclusive of utilities, labour, general expenses, etc., is estimated at about Rs 55,500 (the cost of raw material is not involved as this is custom-processing). This works out to about Rs 46·50 per tonne of stabilized rice bran.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

PERSONNEL NEWS

Appointments/Promotions

Dr C. R. Krishna Murti

Dr C. R. Krishna Murti, Scientist F, Industrial Toxicology Research Centre (ITRC), Lucknow, has been appointed Acting Director, ITRC, with effect from 2 May 1977 for the period of leave and deputation of Dr S. H. Zaidi, Director, ITRC.

Dr P. K. K. Nair

Dr P. K. K. Nair of the National Botanic Gardens (NBG), Lucknow, has been appointed, on promotion, Scientist E1, with effect from 1 April 1977.

Dr Nair (born 6 Feb. 1930) obtained his M. Sc. degree in 1952 from the Banaras Hindu University, Varanasi, and Ph. D. degree in 1958 from the Lucknow University in botany, and has been engaged in research on palynology for over 25 years. He has been working for the last 19 years at NBG where he has set up an active school of research in palynology of cultivated plants.

Dr Nair is the founder General Secretary of the Palynological Society of India, and editor of three journals—Journal of Palynology, the New Botanist, and Glimpses in Plant Research, besides being a member of the editorial boards of a few other plant science journals. He has published 125 research papers and four books on the subject. He has also edited six books on botanical subjects.

Dr Nair has held several professional positions of distinction, such as those of the vice president of the Second International Palynological Conference, Utrecht, 1966; president of the plenary session of the Third International Palynological Conference, Novosibirk, 1971; and president of the division of pollen spore morphology and physiology of the Fourth International Palynological Conference, Lucknow, 1976. Presently, Dr Nair is an elected member of the International Commission for Palynology.

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Dr S.D. Mane has joined, as Pool Officer, the National Chemical Laboratory (NCL), Poona (7 April 1977).

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The following personnel of the Central Fuel Research Institute (CFRI), Dhanbad, have been promoted from Scientist A to Scientist B; Shri P.N. Ash (26 Dec. 1973); Shri A.R.N. Rao (9 July 1974); Shri R.S. Saha (9 July 1974); Shri P.K. Basak (29 Sep. 1974); Shri E. Duraimani (30 Jan. 1975); Shri S. R. Chakraborty (3 Feb. 1975); Shri M.R. Ghatak (18 Feb. 1975); Shri B.D. Mazumdar (18 Feb. 1975); Shri P.N. Ghosh (24 Feb. 1975); Shri S.N. Mukherjee (9 March 1975); Shri Arun K. Choudhury (9 March 1975); Shri T.N. Roy (7 April 1975); Shri B. B. Konar (11 May 1975); Shri B.A. Shamanna (13 May 1975); Shri M.K. Mukherjee (8 June 1975); Shri S.M. Singh (15 June 1975); Shri M.G. Bage (13 July 1975); Shri R.N. Basak (23 July 1975); Shri B.N. Chakraborty (28 July 1973); Shri K. Chentamarakshan (2 Aug. 1975); Shri D.C. Mitra (31 Aug. 1975); and Shri R.M. Mukherjee (28 Nov. 1975).

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The following personnel of CFRI have been promoted from Scientist A1 to Scientist B1: Shri S.B. Chattopadhyay (26 Feb. 1975); Shri S.K. Chatterjee (11 May 1975); Shri B.C. Mitra (11 May 1975); Shri S.R. Sarkar (11 May 1975); and Shri R.N. Bhattacharjee (29 July 1975).

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The following have been appointed Scientist B at the Indian Institute of Petroleum, Dehra Dun : Shri V. S. Saini (9 May 1977); and Shri R. K. Gupta (12 May 1977).

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Shri N. R. Deb has been appointed Scientist C at the National Environmental Engineering Research Institute, Nagpur (4 May 1977).

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Shri K. L. Wadhawan assumed charge as Administrative Officer (selection grade) at the Central Fuel Research Institute, Dhanbad, with effect from 30 May 1977.

Resignations

Dr N.V. Badami, Pool Officer, NCL, Poona, has resigned (29 April 1977).

Retirements

Shri R.C. Shastri, Section Officer, NCL, Poona, has retired (31 March 1977).

Transfers

Shri M. L. Verma, Accounts Officer, Industrial Toxicology Research Centre, Lucknow, took charge, on promotion, as Senior Accounts Officer, Indian Institute of Petroleum, Dehra Dun (18 March 1977).

Honours

Shri P. Jagannatha Rao, Scientist, Central Road Research Institute, New Delhi, has been elected a member of the executive committee of the Indian Geotechnical Society for the period 1977-79.

PATENTS FILED

20/Mas/77 : Improvements in or relating to winding of yarn from hank to cone, K. Sreenivasan & S. N. Govindarajan—SITRA, Coimbatore.

45/Del/77 : Improvements in or relating to powderless etching of aluminium and its alloys for block making, B. A. Shenoi & N. U. Nayak—CECRI, Karaikudi.

48/Del/77 : Improvements in or relating to the preparation of laveomenthol, K. J. Divakar, S. B. Kulkarni & A. S. Rao—NCL, Poona.

49/Del/77 : Improvements in or relating to chemically graining and oxidizing aluminium for use as lithographic plates, B. A. Shenoi & N. U. Nayak—CECRI, Karaikudi.

51/Del/77 : Improvements in or relating to the manufacture of carbon granules suitable for use in telephone transmitters, P. T. John & K. K. Datta—NPL, New Delhi.

61/Del/77 : Fluidized bed burner, P. Basu—CMERI, Durgapur.

70/Del/77 : Improvements in or relating to the preparation of *o*-isopropenylphenols and *o*-isopropylphenols, K. J. Divakar, V. V. Dhekne, (Mrs) S. B. Kulkarni & A. S. Rao—NCL, Poona.

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